

HANDLING FRESH FISH

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1. On the Vessel

Precautionary measures required in handling fish aboard fishing vessels depend largely upon two factors. Of most importance will be the length of time required to transport the fish to shore and the temperature of the fish during transit. Naturally, where fishing grounds are hundreds or thousands of miles from the point where the fish are to be landed, or where tropical climates prevail, great care in providing adequate refrigeration is necessary. The second and less obvious factor includes the species of fish and method by which it is caught. Small fish always are more difficult to keep in good condition than large ones. Thus fish such as halibut or tuna will keep much better than herring or smelt if similar storage conditions are used. Furthermore, methods of catching which permit the least alteration in the fish during catching provide fish of the best keeping quality. Fish caught in traps or purse seines are of best quality immediately after catching since there has been a minimum opportunity for bruising or other damage. Methods of catching which allow the fish to struggle excessively provide a catch of decreased keeping quality. Fish caught in gill nets often struggle for many hours from the time they are caught in the nets until taken aboard the fishing vessel. Such fish during their struggle have prematurely gone into rigor mortis and under such conditions rigor does not persist for normal duration, and keeping quality is diminished. Fortunately gill-net fishing always takes place reasonably close to the point where the fish are landed, so that fish taken by this method are generally in excellent condition. Fish caught in otter trawls have not only struggled considerably but also may be bruised, both factors tending to reduce keeping quality.

Upon being taken aboard the fishing vessel, some species are dressed and others stowed whole. In general, autolytic changes are greatly retarded by dressing the fish while bacterial decomposition is not greatly affected, but the latter is apt to be increased somewhat for dressed fish. Fish which have been feeding just before they are caught are most likely to undergo autolytic decomposition, apparently containing enzymes associated with the digestive process which are of greater activity than those in fish, which have not been feeding. Accordingly, where possible, fish which have been feeding are eviscerated as soon as

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they are taken aboard the fishing vessel. A good example of this practice is found in the salmon fishery. Chum, pink, coho, and sockeye salmon are taken largely near the end of the spawning migration at a time when the fish have not eaten food for a long time and these fish are landed whole. King salmon are taken throughout the year by trollers and since they often have been feeding, they are eviscerated before being landed.

Some species of fish which have been feeding when caught are very difficult to eviscerate. Such fish include those which are caught in huge quantities and which are quite small, as for instance, mackerel. In such cases, evisceration would interfere with fishing operations since the fish are taken aboard the vessel much faster than dressing operations can take place, and such fish are usually landed whole even though dressing them when caught would add considerably to their storage life.

Where any considerable time will elapse between catching and landing of the fish, the catch is iced as it is caught. For this purpose ice mechanically crushed, usually by passing blocks of ice through a crusher consisting of a rotating drum containing short spikes, is used. The crushed ice thus obtained consists of pieces up to the size of an egg. Such ice is used for all but the smallest, most delicate species in which case a special, finely crushed ice is employed which is obtained by using a crusher with more closely spaced picks in the rotating drum.

Fish and ice are mixed in widely varying proportions, depending upon species and size of fish, distance they are to be transported, and climatic conditions. Fish which will be landed within a few hours are generally stowed in the hold without ice. Those which require several days or more are carefully iced in bins, boards usually being placed between layers of fish and ice to prevent the weight of fish from crushing those at the bottom of the hold.

Where considerable handling of the fish aboard the fishing vessel takes place in such operations as dressing, icing, and stowing in the hold, a sharp tined fork is sometimes used. This practice is to be discouraged since each time the fork penetrates the flesh, bacteria present in large quantities at the surface and in the slime are given a chance to penetrate within the flesh at the point where the tine enters the fish. Since several fisheries are conducted without the use of such forks at all it should be possible to dispense with them completely and thus increase the quality of the fish considerably. At any rate where forks are used great care should be taken to use them only on the heads of the fish where bacterial contamination is of less importance.

2. At the Fishing Port

Upon arrival at the fishing port, the fish are unloaded either on elevators, often of the endless chain, bucket type which can be lowered to the level of the fishing vessel or scow, or by means of baskets operated by hoists from the fishing vessel hold to the wharf. Here the fish are usually first weighed and then carted to the fish house for dressing and packing for shipment.

Fresh fish are generally marketed in one of the following ways: whole or round, in which the fish are not dressed in any way; gibbed, in which the gills and viscera are removed without slitting the belly cavity; eviscerated, in which the viscera are removed by slitting the belly cavity, but gills are usually left intact; dressed, in which head, fins, tail, and viscera are all removed; as split fish, where the fish is split down the backbone, head and viscera removed, the two halves held together by the belly wall being left intact; fillets, in which the flesh is cut into two boneless strips one from each side and either with or without the skin removed; butterfly fillets, where the two fillets are left adhering together at the backbone; sticks consisting of uniform width sections of fillets; and steaks consisting of cross-section slices of fish cut at right angles to the backbone and about one-half inch thick.

Fish are usually packed directly in the same kind of crushed ice as is used on the fishing vessel, although with some small, delicate species, shaved ice (known sometimes in the fisheries as "dry ice" but not to be confused with carbon dioxide dry ice) is employed. The amount of ice used will depend on climate and distance to be shipped. Fillets or steaks were formerly packed in tin containers but since the tin shortage has become acute wooden, or, in some cases, waxed cardboard boxes containing 10- to 25-lb. fillets and sometimes lined with moisture-proof paper are employed. These boxes are then packed in large wooden boxes of crushed ice. Whole fish are packed in large wooden boxes of crushed ice; however, no standard size of box is prevalent in the industry. Wooden barrels are also being used though not so much as formerly. Fish are shipped by rail (usually express) or by truck. In the former case the fish are placed either in refrigerated cars having ice bunkers at each end or in the regular express cars. In the latter case the boxes of fish are frequently covered with cubes of dry ice and the latter inclosed with insulated tarpaulins. This practice greatly reduces melting of ice and eliminates necessity for re-icing in transit.

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PRODUCTION OF FRESH AND FROZEN PACKAGED FISH IN THE UNITED STATES, 1946

By Method of Preparation

Item	Fillets		Steaks		Pan-dressed		Split "butterfly"		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Fresh	58,864,165	\$17,690,039	86,353	\$29,938	2,930,255	\$143,265	633,400	\$171,750	62,514,173	\$18,034,992
Frozen	106,083,032	25,781,419	2,311,472	703,457	14,688,983	1,907,627	2,883,026	455,043	125,965,913	28,247,546
Total	164,947,197	43,471,458	2,397,825	733,395	17,618,638	1,450,892	3,516,426	626,793	188,480,086	46,282,538

Species	Fillets				Steaks, pan-dressed, and split "butterfly"			
	Fresh		Frozen		Fresh		Frozen	
Blue pike	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod	956,282	\$499,145	229,457	\$114,633	(2)	(2)	-	-
Croaker	1/8,988,072	2,464,904	9,144,296	2,282,140	(2)	(2)	-	-
Cusk	3/41,400	9,950	(2)	(2)	(2)	(2)	1/125,000	\$34,400
Flounders	246,929	66,360	134,857	28,281	-	-	-	-
Haddock	13,464,459	4,325,558	8,435,886	2,551,627	-	-	-	-
Hake	23,984,852	7,442,689	18,455,998	5,544,141	-	-	-	-
Halibut	1,990,899	447,471	1,933,694	304,185	-	-	634,410	203,040
Herring, lake	-	-	2,677	6,941	-	-	-	-
Lake trout	393,455	62,643	79,240	20,248	-	-	-	-
Lingcod	94,573	55,746	10,893	5,902	-	-	-	-
Mackerel	318,217	70,808	680,249	177,911	(2)	(2)	1/338,325	65,711
Ocean pout	633,355	132,545	1,715,935	341,115	-	-	-	-
Pike or pickerel	111,162	17,633	56,245	8,714	-	-	-	-
Pollock	3/42,026	12,793	(2)	(2)	-	-	-	-
Rockfishes	2,358,945	375,657	9,984,197	1,345,104	-	-	(2)	(2)
Rosefish	1,422,274	299,865	1/3,641,443	919,432	-	-	-	-
Sablefish	698,588	153,416	48,808,752	11,556,222	(1)	(1)	1/108,877	26,719
Salmon	16,115	3,425	57,227	14,574	(1)	(1)	1/1,265,628	416,550
Sauger	(2)	(2)	5/12,346	6,620	-	-	-	-
Scup	835,835	33,107	240,518	115,509	-	-	-	-
Sea bass	234,602	63,900	-	-	1/90,000	\$25,150	(2)	(2)
Sheepshead	85,000	24,940	-	-	(2)	(2)	(2)	(2)
Spanish mackerel	23,771	5,880	3,613	808	-	-	-	-
Squeteagues	6/16,433	5,086	-	-	448,000	132,490	653,814	86,438
Sucker "mullet"	359,000	81,480	37,900	7,580	(2)	(2)	-	-
Sucker "mullet"	3/25,807	5,293	(2)	(2)	-	-	-	-
White bass	3/37,751	14,828	(2)	(2)	-	-	-	-
Whitefish	140,494	74,480	10,000	4,845	-	-	-	-
Whiting	266,851	60,291	2,068,070	313,804	3,034,155	158,645	16,759,595	1,635,582
Wolfish	76,367	18,775	161,191	35,327	-	-	-	-
Yellow perch	443,127	210,625	42,715	20,638	-	-	-	-
Yellow pike	582,292	302,109	114,440	56,142	-	-	-	-
Miscellaneous	7/25,346	10,723	(2)	(2)	8/41,500	17,949	(2)	(2)
Total	58,914,279	17,702,105	106,066,503	25,777,979	3,613,655	334,234	19,885,649	2,468,220

- 1/ Includes some fresh pan-dressed, split "butterfly," and steaks.
- 2/ As less than three firms reported the production of this item, this production has been included in another form of processing for the same species.
- 3/ Includes some frozen fillets.
- 4/ Includes some frozen pan-dressed, split "butterfly," and steaks.
- 5/ Includes some fresh fillets.
- 6/ Includes some fresh and frozen pan-dressed, split "butterfly," and steaks.
- 7/ Includes fresh fillets of perch and shad, and frozen fillets of buffalo fish, carp, groupers, red drum, red snapper, striped bass, and miscellaneous fish.
- 8/ Includes fresh pan-dressed catfish, fresh steaks of grouper, red snapper, striped bass and swordfish, and frozen pan-dressed mullet.

Note:—The totals appearing in the above table cannot be correlated directly with those in the summary table since it has been necessary to combine certain items in order to show the entire production of each species. Data on the production of packaged fish in California are not included in this report, since these data are not available. The production in California is estimated at about 7,500,000 pounds

PRODUCTION OF FRESH AND FROZEN PACKAGED FISH IN THE UNITED STATES, 1946—CONTINUED

By species and geographical sections

Species	New England		Middle Atlantic		Chesapeake Bay, South Atlantic, and Gulf		Great Lakes		Pacific Coast (excluding California)		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike	1/14,154	565	2,974,874	\$967,811	-	-	1,185,739	\$613,778	-	-	1,185,739	\$613,778
Cod	-	-	(2)	(2)	-	-	(2)	(2)	1,002,929	\$234,661	18,132,368	4,747,044
Croaker	-	-	-	-	166,400	\$44,350	-	-	-	-	166,400	44,350
Cusk	381,786	94,641	-	-	-	-	-	-	-	-	381,786	94,641
Flounders	12,285,036	3,826,688	3,566,256	1,320,674	1/91,435	1/28,767	(2)	(2)	5,957,618	1,701,056	21,900,345	6,877,185
Haddock	36,496,852	11,001,950	5,943,998	1,984,880	-	-	(2)	(2)	-	-	42,440,850	12,986,830
Hake	3,300,112	581,991	624,481	169,665	-	-	-	-	-	-	3,924,593	751,656
Halibut	-	-	-	-	-	-	-	-	641,351	205,717	641,351	205,717
Herring, lake	-	-	-	-	-	-	472,695	82,891	-	-	472,695	82,891
Lake trout	-	-	-	-	-	-	105,466	61,648	-	-	105,466	61,648
Lingcod	-	-	-	-	-	-	-	-	1,336,791	314,430	1,336,791	314,430
Mackerel	-	-	(2)	(2)	-	-	(2)	(2)	-	-	2,349,290	473,660
Ocean pout	1/2,349,290	1/473,660	-	-	-	-	42,026	12,793	-	-	167,407	26,347
Pike or pickerel	167,407	26,347	-	-	-	-	-	-	-	-	42,026	12,793
Pollock	12,184,980	1,688,647	158,162	32,094	-	-	-	-	5,064,017	1,219,402	12,343,142	1,720,741
Rockfishes	-	-	(2)	(2)	-	-	-	-	-	-	5,064,017	1,219,402
Rosefish	49,507,340	11,709,638	-	-	-	-	-	-	182,219	44,718	49,507,340	11,709,638
Sablefish	-	-	-	-	-	-	(2)	(2)	1,277,974	422,950	182,219	44,718
Salmon	-	-	-	-	-	-	-	-	-	-	1,277,974	422,950
Sauger	-	-	-	-	-	-	1,076,753	498,416	-	-	1,076,753	498,416
Scup	-	-	1/234,602	1/63,900	(2)	(2)	(2)	(2)	-	-	234,602	63,900
Sea bass	-	-	(2)	(2)	1/175,000	1/50,090	-	-	-	-	175,000	50,090
Sheepshead	-	-	-	-	1/16,433	1/5,086	27,384	6,688	-	-	27,384	6,688
Spanish mackerel	-	-	-	-	890,714	131,498	-	-	-	-	16,433	5,086
Squeteagues	-	-	603,000	176,490	-	-	-	-	-	-	1,498,714	307,988
Suckers	-	-	-	-	-	-	25,807	5,293	-	-	25,807	5,293
White bass	-	-	-	-	-	-	37,751	14,828	-	-	37,751	14,828
Whitefish	-	-	-	-	-	-	150,494	79,325	-	-	150,494	79,325
Whiting	-	-	-	-	(2)	(2)	-	-	-	-	22,128,671	2,168,322
Wolffish	21,802,186	2,095,156	326,485	73,166	-	-	-	-	-	-	237,558	54,102
Yellow perch	1/237,558	1/54,102	(2)	(2)	-	-	485,842	231,263	-	-	485,842	231,263
Yellow pike	-	-	-	-	-	-	696,732	358,251	-	-	696,732	358,251
Miscellaneous	3/17,736	3/9,934	(2)	(2)	3/31,400	11,870	3/17,410	6,763	-	-	66,546	28,567
Total	152,884,848	35,107,326	14,436,858	4,788,680	1,371,382	271,661	4,324,099	1,971,937	15,462,899	4,142,934	188,480,086	46,282,538

1/ Includes a small quantity of this species produced in another section which cannot be shown separately as less than three firms reported its manufacture.

2/ Data are shown only when three or more firms reported a production of a species. In those instances where less than three firms reported, the production has been included with that of another section.

3/ New England includes shad and swordfish; Chesapeake, South Atlantic and Gulf - catfish, grouper, mullet, red drum, red snapper, and striped bass; and Great Lakes - buffalo fish, carp, and miscellaneous fish.

Note:— Packaged fish were produced in the following States: New England - Maine, Massachusetts, and Connecticut. Middle Atlantic - New York and New Jersey; Chesapeake Bay, South Atlantic, and Gulf - Virginia, North Carolina, and Alabama; Great Lakes - New York, Pennsylvania, Ohio, Illinois, Michigan, Wisconsin and Minnesota, and Pacific - Washington and Oregon.